[0106] The appended claims are not intended to be limited to the embodiments shown herein, but are to be accorded the full scope consistent with the language of the claims, wherein reference to a feature in the singular, such as by use of the article "a" or "an" is not intended to mean "one and only one" unless specifically so stated, but rather "one or more". Further, in view of the many possible embodiments to which the disclosed principles can be applied, I reserve to the right to claim any and all combinations of features and technologies described herein as understood by a person of ordinary skill in the art, including, for example, all that comes within the scope and spirit of the following claims.

We currently claim:

1. An earphone comprising:

a housing and a corresponding user-contact surface configured to urge against a user's anatomy, wherein the housing defines an acoustic chamber and an acoustic port opening from the acoustic chamber, the user-contact surface configured to form an acoustic seal with the user's anatomy and acoustically couple the acoustic chamber with the user's ear canal when the earphone is donned;

an acoustic driver positioned in the housing and acoustically coupled with the acoustic chamber;

a microphone transducer acoustically coupled with the acoustic port; and

a processing component configured to detect anti-resonance in sound observed by the microphone transducer across a selected spectral envelope below, spanning or above the upper threshold of human hearing.

2. The earphone according to claim **1**, wherein the processing component is further configured to classify the earphone as being donned when anti-resonance is detected.

3. The earphone according to claim **2**, wherein the processing component is further configured to classify a quality of the acoustic seal between the user-contact surface and the user's anatomy based at least in part on the frequency response across the spectral envelope.

4. The earphone according to claim **1**, wherein the processing component is further configured to affect operation of the earphone responsive to detection of anti-resonance in the spectral envelope.

5. The earphone according to claim **1**, wherein the processing component is further configured to cause the acoustic driver to emit sound in the spectral envelope and to cause the microphone transducer to observe sound in the spectral envelope.

6. The earphone according to claim **1**, wherein the spectral envelope has a lower frequency threshold of about 20 kHz and an upper frequency threshold of about 24 kHz.

7. The earphone according to claim **1**, wherein the processing component is further configured to assess a frequency response across the spectral envelope and to identify a presence of a notch in the frequency response.

8. The earphone according to claim **1**, further comprising an ear-tip defining the user-contact surface, wherein the user's anatomy comprises an inner surface of the user's ear canal, wherein the user-contact surface is configured to urge against the inner surface of the wearer's ear canal and form the acoustic seal.

9. An earphone comprising a housing, a loudspeaker transducer and a microphone transducer positioned in the housing, a processor, and a memory, wherein the memory contains instructions that, when executed by the processor, cause the earphone:

to assess sound observed by the microphone within a frequency band having a lower threshold of about 20 kHz and an upper threshold of about 24 kHz; and

based on the sound assessment, to determine when the earphone is donned by a user.

10. The earphone according to claim **9**, wherein the assessment of sound comprises an assessment of a frequency response within the frequency band.

11. The earphone according to claim **10**, wherein the instructions, when executed by the processor, further cause the earphone to identify a presence or an absence of anti-resonance within the frequency band from the assessment of the frequency response.

12. The earphone according to claim **10**, wherein the instructions, when executed by the processor, further cause the earphone to classify a quality of fit between the earphone and a corresponding region of a user's anatomy.

13. The earphone according to claim **9**, further comprising an in-ear ear-tip defining a corresponding user-contact surface configured to urge against a wall of a user's ear canal and form an acoustic seal between the in-ear ear-tip and the user's ear canal.

14. The earphone according to claim **13**, wherein the housing defines an acoustic chamber and the in-ear ear-tip defines an acoustic port opening from the acoustic chamber, wherein the acoustic port is configured to acoustically couple the acoustic chamber with the user's ear canal when the in-ear ear-tip is inserted into the user's ear canal.

15. The earphone according to claim **14**, wherein the instructions, when executed by the processor, further cause the earphone to classify a quality of the acoustic seal between the in-ear ear-tip and the user's ear canal.

16. A method for controlling operation of an earphone, wherein the earphone houses a microphone transducer and an acoustic driver, the method comprising:

emitting sound across a spectral envelope with the acoustic driver;

assessing sound observed by the microphone within the spectral envelope, wherein the spectral envelope has a lower threshold of about 20 kHz and an upper threshold of about 24 kHz; and

based on the sound assessment, determining when the earphone is donned by a user.

17. The method according to claim **16**, wherein the act of assessing sound within the spectral envelope comprises determining a presence or an absence of anti-resonance within the spectral envelope.

18. The method according to claim **17**, further comprising classifying a quality of fit between the earphone and a user's anatomy based on the sound assessment.

19. The method according to claim **16**, affecting operation of the earphone responsive to detection of anti-resonance in the spectral envelope.

20. The method according to claim **16**, wherein the act of assessing sound within the spectral envelope comprises assessing a frequency response across the spectral envelope.

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